SS838 COATING TECHNOLOGY 4-0-0-4

Unit 1 Introduction to Paints

General introduction to paint industry - definition of paints, varnishes and lacquers their constitution and functions, general classification of surface coatings - decorative and protective coatings**,**

Unit 2 Coatings

Coating methods: Roll coating, spray coating, powder coating, fluidised bed coating, electrostatic powder spray coating, electrostatic fluidised bed coating, vacuum coating, coating materials, binder oils

Unit 3 Binding media, solvents and additives

Fundamentals of film formers, chemical structure of monomers, functionality and its determination, degree of polymerization and molecular weight, non-convertible and convertible film formers, linear, branched and cross linked film formers, homopolymers and copolymers - Manufacture, chemistry and applications of alkyd resins, Polyester resins, Phenolic Resins, amino resins, epoxy resins, polyamide resins, polyurethanes, silicone resins, vinyl and acrylic resins - emulsions - polystyrene and styrene-acrylic emulsions. Solvents, dryers, surfactants and other additives in paints.

Unit 4 Adhesives

Mechanism of adhesion, mechanical interlocking, inter diffusion, adsorption and surface reaction, electrostatic attraction. Surface and interfacial properties, surface topography, surface tension and energy, wetting and setting, thermodynamic work of adhesion. Surface characterization, profilometry, low energy electron diffraction, attenuated total reflection spectroscopy, XFS, ESCA, ion scattering spectroscopy, secondary ion mass spectroscopy. Surface treatment CASING (Crosslinking by Activated Species of Inert Gas) or plasma treatment, corona discharge, acid etching, trans crystallisation growth.

Interfacial chemical bonding, coupling agents, strength of adhesive joints, fracture mechanism of simple joints, Modes of failure peeling separation, lap shear, tensile detachment from a rigid plane. Tack and auto adhesion, pressure sensitive adhesion, tackifiers, rate of peel and temperature effects in pressure sensitive adhesion, auto adhesion of elastomers.

Unit 5 Durability and ageing

Ageing properties of coatings, weatherometery, natural outdoor durability test accelerated outdoor weathering, artificial weathering tests, defects observed in paint film on exposure.

TEXTBOOKS/ REFERENCES:

1. *Australian OCCA, 'Surface Coating Technology Volume 1', Chapman and Hall, 1974.*
2. *W.M.Morgan, 'Outline of Paint Technology', John Wiley sons, 1990.*
3. *L. S. Pratt, 'Physics & Chemistry of Organic Pigments', Wiley, 1947.*
4. *H.Y. Payne, 'Organic Coating Technology Vol, 1 & 11', John Wiley & Sons, 1954.*
5 *Skiest (Ed) Handbook of Adhesion 111 Ed.Van Nonstrand Reinhold, 199.*

SS839 SILICON CHEMISTRY AND DRUG DESIGN 4-0-0-4

Unit 1 Physicochemical properties of drugs in relation to biological action

Acid-Base Properties, Water solubility, Partition coefficient, drug administration, drug distribution, metabolism (Phase I and Phase II) and toxicity of drug receptor interaction, conformational flexibility and multiple mode of action, optical isomerism and biological activity, selected physico-chemical properties (Ionization, hydrogen bonding and biological action, chelation and biological action, oxidation - reduction potential and biological action, absorption and orientation at surfaces) Enzymes, hormones and Vitamins - representative cases, nomenclature, classification and characteristics of enzymes, mechanism of enzyme action, factors affecting enzyme action, co-factors and co-enzymes, enzymes in organic synthesis, mechanism of enzyme catalysis, enzyme inhibition.

Unit 2 Essentials of drug design

Molecular mimetics, drug-lead modification, drug design using QSAR and computer assisted design, assessment of drug activity, receptors and drug action, mechanism of drug action, drug metabolism pathways, Drug potentiation, drug antagonism and drug resistance

Unit 3 Silicon in medicinal chemistry

Organosilicon molecules with medicinal applications, chemical properties of organic silicon relevant for medicinal chemistry, silicon containing amino acids and analogues, Organosilicon based fluoride acceptors for imaging, Trialkyl silyl derivatives of drugs and biologically active molecules, Hydrophobic quaternary silanes, Increased hydrophobicity of silyl groups & effect on biological activity,

Unit 4 Silicon derivatives

Disilyl&disilacyclic compounds & related derivatives, spirosilanes & other silacyclic derivatives, Diphenyl silane derivatives, Silyl groups as isosteres of quaternary ammonium groups, Silyl ethers as hydrophobic substituents, silicates, silanols, silanediols & silanetriols, Hypervalent silicon compounds, stability of organo silicon compounds, silyl ethers and drug delivery strategies related to silicon, metabolism of organosilicon molecules.

Unit 5 Medicinal agents

Medicinal agents belonging to alkaloids, steroids, polypeptides, modified nucleic acid bases, sulphonamide and sulpha drugs, antibacterials - sulpha drugs, substituted sulphonamides, anticonvulsants, anticoagulants, antiamoebic agents, antihelmintic agents, anti-malarial agents, diuretics and cardio vascular agents, drugs for AIDS, medicinal agents affecting CNS, analgesics, antipyretics, antiseptics and disinfectants.

TEXTBOOKS/ REFERENCES:

1. *John M beak and John H Block, 'T Wilson, O. Gisvold and R. F. Deorge - Text book of Organic, Medicinal and Pharmaceutical Chemistry', 7th edition, J.B. Lippincott Williams and Wilkons Company, 1977.*
2. *A.Burger, 'Medicinal Chemistry', 3rd edition, Wiley Interscience, 1970.*
3. *V.K.Ahluwalia and Madhu Chopra, 'Medicinal Chemistry', Ane Books pvt Ltd, 2008.*
4. *V.Kothekar, 'Essentials of Drug Designing', 14th edition, Dhruv publications, 2005.*
5. *V.K.Ahluwalia, Lalita S.Kumar and Sanjiv Kumar, 'Chemistry of Natural Products', Ane Books India.*

6. L.P.Graham 'An introduction to Medicinal Chemistry', 3rd edition, Oxford University Press, 2005.
7. Fujii S and Hashimoto Y; Progress in the medicinal chemistry of silicon: C/Si exchange and beyond;. Future Med Chem. 2017 Apr; 9(5):485-505.
8. Franz AK1, Wilson SO; Organosilicon molecules with medicinal applications; J Med Chem. 2013 Jan 24;56(2):388-405